Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

cases, and on the grounds of the now growing famous resort in our county, "Turkey run," or as it is called by people away from here, "Bloomingdale glens," are several such cases.

In a future article I shall show how the forest leaves have preserved the sides of hills and thus allowed the small streams to cut out the bottoms of the hollows deep, steep and sharp, which are rapidly changing since the country has been cleared and farmed. Also how they have preserved the ancient beds of streams along the terrace bottoms of the Wabash river and its principal tributaries till they are as sharply defined after the lapse of no one can venture to guess how many thousands of years, as they were when the last great final flood that cut out the beds swept over these plains.

I have said the storm here described was a cyclone. This I infer from the way the trees had fallen. In some parts of the track the trees were thrown in every direction, and the course of the storm could only be determined by the general course of the track, and not by the fall of individual trees.

The course of this storm is N. 44° 30′ E. in this county. In all my recollection of storms I never saw but one (in 1883) which bore so much to the north, and that one was the most threatening and awful in its appearance I ever saw, and did in localities much damage. Its course was about N. 37° E., or about 7° 30′ more north than the ancient one. The great majority of the storms I have seen, and of those which have left plain tracks, are from a few degrees north to a few degrees south of west.

——:o:——

ON THE MOUNTING OF FOSSILS.

BY FRANKLIN C. HILL.

THE five expeditions which have gone to the far West from Princeton have brought in many valuable fossils—invaluable is perhaps the better word—chiefly remains of vertebrates.

For the double purpose of utilizing and of preserving these treasures they have been mounted in a manner new in this country, and it is believed not common abroad, though somewhat practiced there.

The leading idea of the system is that each piece shall be set up in its natural position.

Our museum now contains nearly 400 such specimens, which

have attracted much attention and admiration from visitors, both scientific and lay, and I have been often urged to publish some account of my methods and results.

Although many fossil bones are whole and clean when found, many more of them are broken and more or less clogged with matrix. The freeing of this last and the mending of the broken are troublesome and delicate tasks. Mallet and chisel come into play, their sizes depending on the nature of the case. For the heavier work ordinary stone-cutter's tools can be used, yet it is commonly better to make haste slowly and use needles, and no needle is more useful than a No. 1 sharp. By wrapping the eye end of the needle with a narrow strip of paper it can be made to fit in the clamp of a patent sewing haft, and a chisel made, which with a dogwood stick of from one to one and a-half inches diameter and nine inches long for a mallet, is capable of doing very delicate work, and also much which at first sight would seem to be entirely too heavy for so light a tool.

For reaching into the deeper cavities a No. 12 knitting needle, well set into an awl handle, is needed, while for cleaning out the carapaces of turtles it is well to have special long handles made. Darning needles are of convenient size but of too poor a quality of steel.

But whatever needle is used, a good oil-stone should always be at hand to renew the point as often as it is blunted. By a little practice a point can be put to a needle much better for this work than the original one.

A good stiff tooth-brush is needed, a good lens, say Tolles' one inch triplet, and a hand mirror to throw light into cavities of heavy specimens that cannot be easily turned.

A high workbench with vise, plyers, anvil and hammers, drills, a flat cushion to lay specimens on while being worked, and an assortment of wire complete the "kit" of tools, but a pot of mucilage and a box of calcined plaster are also needed for mending the broken. It is best to have always a number of specimens on hand so that the mended can be allowed to dry without delay to the work.

Of the cements that we have tried at Princeton, we have given up all but the one which we began with, recommended to us years ago by Professor R. P. Whitfield, and published by me in the *Am. Jour. Pharmacy*, May, 1875. It is: Starch one part

white sugar four parts, gum arabic eight parts and water q. s., boiled together after the manner of an apothecary. Latterly we have added a small quantity of salicylic acid to prevent fermentation. It should be about as thick as honey, and for joints that do not fit neatly it is well to thicken it at the moment of using with plaster of Paris. For filling large voids plaster enough should be kneaded in to make a stiff putty, and it is well to work in with it as many pieces of stone or brick as possible, both to save material and to lessen the shrinkage of the mass.

Although I sometimes paint the masses of plaster which show themselves, to destroy the unpleasant violent contrasts of color, I always use some neutral tint entirely different from the color of the fossil, in order that the false parts can be easily distinguished.

With the outfit described, a smooth-grained and moderately hard matrix and good hard bones the work is pleasant and easy. But when the matrix is of cemented gravel, here hard as flint, there loose sand, with soft and crumbly bones, a large stock of patience and good temper must be laid in also.

When the bone is freed from the matrix and mended, the question comes up as to how to keep it safely and show it to advantage. If economy of space be important, a drawer just deep enough to receive it is perhaps the best receptacle; but if we wish to exhibit it to the public a glass case is needed.

To ordinary observers, and even to pretty fair anatomists, bones on a tray or shelf say little. In a museum the inexpert visitor must, for obvious reasons, be considered as well as the student and professor, and experience shows that a bone in its natural position, even if alone, is easier to understand than when reversed, while if several bones are combined so as to form a foot, or leg, a spinal column or a skull, the value of each is greatly increased. Following out this idea I have been led to mount every skull, or limb, or bone, or even fragment of a bone which has character enough to be worth preserving, and have obtained results better than my hopes.

A single ramus of a lower jaw lying on its side in a tray shows but badly, and is liable to be thrust aside and jostled, to the great danger of its teeth and coronoid. But hold it in its natural position, and note its length and width. Then have a neat block of some hard wood, say cherry or black walnut, cut and polished

with shellac, not varnish, and selecting a wire of suitable size, make two hooks, like Fig. 1, to fit the jaw near its ends, set them up in the block, slip the jaw into them and it speaks for itself, and is safe. Of course the block must always be just so large that no part of the bone will overhang the edge, and then the specimen will not be injured by crowding it against the wall or another specimen. If larger than needed it wastes shelf-room. If the specimen be large and heavy, or at all crumbly, the supports need to be wrapped with cloth or felt to protect it.

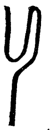

Fig. 1

Fig. 2

Suppose we have both rami, or the greater part of them. Mend the breaks with the cement, and when dry bend two stout wires as in Fig. 2, one to bind the jaws together at each end, cement them in place and let them dry. Then set up three wire hooks to receive these braces, as at *b* and *c*, Fig. 3, one in front and two behind, as far apart as the jaw will allow. The use of these hooks is so obvious that the most careless or dull student can hardly fail to see it, which is a good thing, because if a

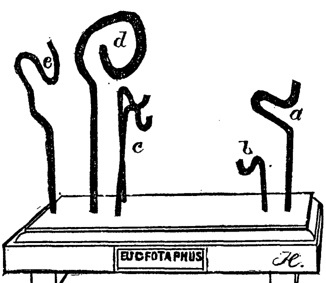

Fig. 3

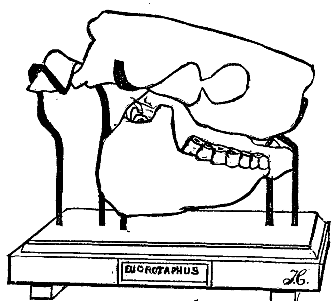

Fig. 4

Skull and atlas, eight and a half inches long.

blunder be possible some persons can always be depended on to make it, and hence come many breakages. If beside the jaw we have the skull, we need two more wires, one to catch the back of the skull at the glenoids (Fig. 3 *d*), and the other to support the nose (*a*).

In this specimen the sixth wire (*e*) carries the atlas, as shown in Fig. 4. When it came from Dakota it was a solid block of stone with corners of the bone sticking out, and it was worked apart entirely with needle and mallet.

Take another case (Fig. 5). Here are almost all the parts of Hyænodon's hind leg and foot, with part of the pelvis, a chaos as they lay in a tray. But by first glueing the tarsals together in position and making them a bed on a plaster base, and then bedding each metatarsal and phalanx in turn, I was able to display the foot. The tarsals were then set free by soaking in water. Fastening this plaster base to the black walnut pedestal by a screw-bolt, I set up behind it a post, eighteen inches high, into which wires were set, as shown in the figure. The small figures behind show the wires as seen from above "in plan." The main curves in *a* and *b* hold the tibia and their ends catch the fibula. Patella sits in the loop of *c*, *d* and *e* steady the head of femur, while *f* and another wire behind the post hold the pelvic fragment. Each bone is marked with the museum number of the specimen somewhere on its surface.

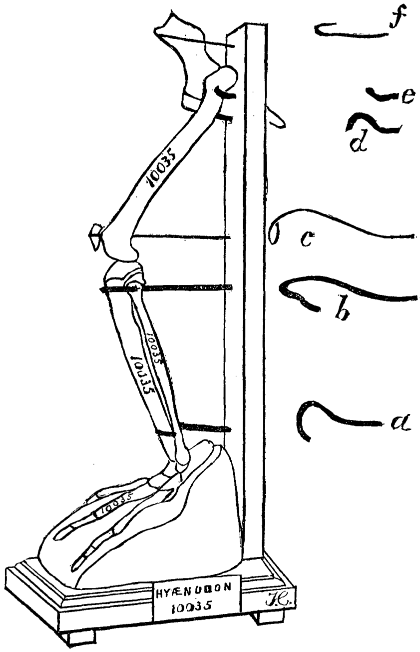

FIG. 5.

The adjustment of these wires is a nice matter. Each bone must have its natural position, but must be under no strain; must be held in its place securely, and yet be so free as to be easily lifted out. It must stay by gravity only.

For small specimens all that is needed to secure the wires in the pedestal or post, is to bore a clean hole a trifle smaller than the wire and force the wire into it, taking care not to turn it in the hole afterwards. For heavier bones, where wire of one-eighth inch and over is used, it is better to cut a thread on the wire and screw it in.

Some practice is needed to bring the wires to their proper shape. No two bones are ever quite alike, and hence each wire

must be fitted to its own place by experiment. When a new curve is put into one end of a crooked wire the path of the other end through space defies mathematics.

With heavy bones it is sometimes hard to make them rest in their supports without strain, though it can be done. We have an enormous femur of a mastodon which seems to be held up by a post behind it, while really the whole weight is borne by a plaster base in which the condyles rest, and the upper end does not even touch the post or the guard wires. The hind leg of Loxolophodon is mounted on a plaster base of the computed height

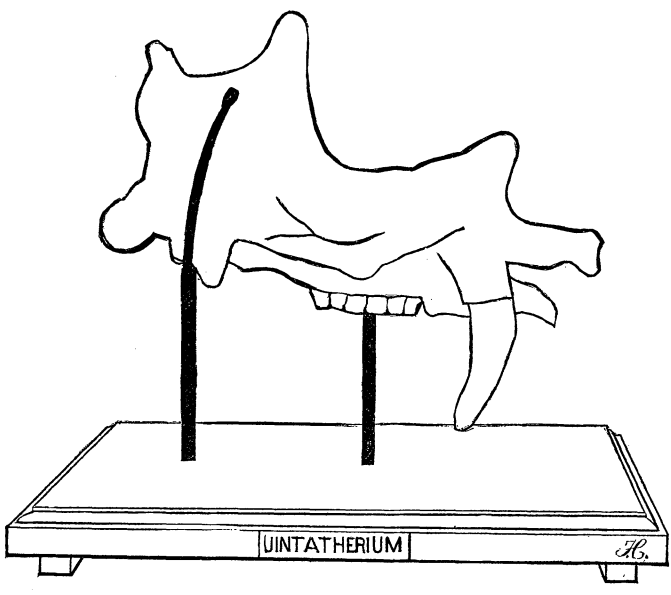

FIG. 6.—Skull, thirty-one inches long.

of the foot, which takes so much of the weight that there is no strain on the rod which guards the head of the tibia.

We have now five mounted skulls of the Uintatherium family, and their mountings give a fine example of evolution. The first one is sustained by five distinct iron rods whose flat feet are secured by sixteen screws to a painted pedestal of white pine, the irons weighing over eight pounds.

The last one, a much larger and finer specimen, is carried by two rods screwed into the black walnut pedestal. The rearward rod (Fig. 7) sends off a branch from each side just below the

felted saddle in which the basioccipital rests, which branches curve upwards and press against the bases of the rear horn-cores, so-called, and hold all firmly in place. The front iron has a small square button on top, felted, on which the roof of the mouth rests. These irons weigh four pounds.

While it is of course impossible to fix a maximum for the size of pedestals, a minimum is a good thing to have, and I have fixed on 3 in. × 1½ in. × 1 in. high. This gives room for a good sized label on the side, giving genus and species, geological formation, locality and catalogue number.

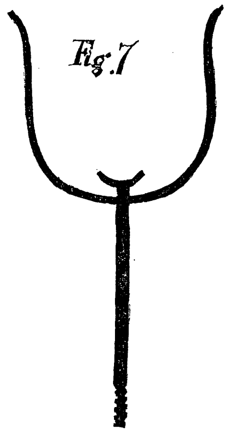

Fig. 7

For very small jaws, single small teeth, &c., I set up a small cylinder of plaster on one of the smallest pedestals, and cement the specimen to the top of it. In other cases, as in *Didelphys pygmæa* Scott, and the Aciprion jaws shown in Fig. 8, the slab of matrix is cemented to the surface of a board hung on two pivots, so that it can be tilted to either side for examination. And when a new specimen shows new features I devise a new mounting to suit them.

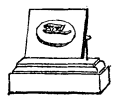

Fig. 8

3 PEDESTAL IN LONG

——:o:——

RECENT LITERATURE.

CROLL'S CLIMATE AND COSMOLOGY.[1]—In this volume of essays, Mr. Croll reaffirms his physical theory to account for the glacial climate in a way to command the attention of every geologist and in a manner which will attract the interest of the lay reader. The discussions relate to questions of the deepest interest, and the arguments used are certainly strong ones. Mr. Croll's peculiar views as to the existence of glacial climates before the Quaternary period are restated with much fullness, though he candidly admits that most geologists are opposed to them.

The author's theory is usually called the "eccentricity theory," but he prefers to call it the "physical theory." He states that a high state of eccentricity of the earth's orbits will not necessarily

[1] *Discussions on Climate and Cosmology.* By JAMES CROLL, LL.D., F.R.S. New York, D. Appleton & Co., 1886. 12mo, pp. 327. $2.